Original Article

Subjective Need and Orthodontic Treatment Experience in a Middle East Country Providing Free Orthodontic Services: A Questionnaire Survey

Heidi Kerosuo, DDS, PhD[a]; Ebrahim Abdulkarim, DDS[b]; Eero Kerosuo, DDS, PhD[c]

Abstract: The aims of this study were to explore orthodontic treatment experience, subjective need for treatment, and perceptions of teeth and dental appearance in relation to background factors such as funding system, area of living, age, gender, ethnicity, and socioeconomic status. The subjects were 1076 randomly selected second-year high school students from a rural (Jahra) and an urban (Capital) area of Kuwait, with a mean age of 15.1 years. Kuwaiti citizens constituted 79% of the sample, and the rest were of other Arab origins. The data were collected using a questionnaire. Orthodontic treatment rate was significantly higher for Kuwaitis (10%) than for non-Kuwaitis (2%). Among Kuwaiti subjects, urban area of living and female gender increased the odds of receiving orthodontic treatment. Subjective treatment need was 36%, with no difference between Kuwaiti and non-Kuwaiti subjects, but Kuwaitis in the rural area expressed subjective treatment need less often than those in the urban area. The results suggest that access to free-of-cost orthodontic treatment was likely to affect treatment rate, whereas it did not seem to influence the self-perceived need for treatment. Gender and area of living may be significant for the distribution of free-of-cost orthodontic treatment. (*Angle Orthod* 2002;72:565–570.)

Key Words: Treatment rate; Self-perceived treatment need; Urban-rural difference; Free treatment

INTRODUCTION

Over the last two decades, most industrialized countries have seen a steady increase in the number of orthodontic treatments.[1] But reports on different European populations suggest that treatment rate of adolescents and young adults may vary from 15% to as high as 63%, depending on age, country, and area of sampling.[2–11]

Orthodontic treatment rate is determined not only by the prevalence and severity of the malocclusion but also by other influencing factors such as gender,[1,4–6] socioeconomic status[1,12] and ethnic origin,[12] as well as availability and funding of the orthodontic services.[1,8,9,12] Girls, in general, are treated more frequently than boys.[4–6] But although subjects of higher socioeconomic groups are overrepresented among consumers of self-financed orthodontic services,[12] the effect of this variable is unclear when treatment is available at no cost.[6,13–15] It has been established that better availability of health care services may result in increased use and demand of services.[16] Accordingly, district-level differences in uptake of orthodontic treatment have been observed to correlate strongly with the distribution of the orthodontic manpower in the areas.[1,2,8,17]

The major motivation for seeking orthodontic treatment is a desire to improve dental appearance.[1,18] But the range of the occlusal and dental variations that is perceived as acceptable or normal has been found to be fairly wide and to vary among individuals, societies, and cultures.[1,2,19,20] Subjects of rural areas, characterized by a lower uptake of orthodontic treatment, have been found to be more tolerant to the presence of malocclusions than subjects in urban areas with high frequency of treatment.[2,21] An association between the desire for treatment and the professional assessment of malocclusion severity has been demonstrated.[22,23] But there is a general agreement that the subjective treatment need, as estimated by both adolescents and adults, is lower than the objective need as estimated by dentists.[3,4,9,24–26]

Kuwait has provided free-of-cost oral health care since the 1970s.[27] Orthodontic treatment is included, but it is available only to Kuwaiti citizens and is provided by spe-

[a] Associate Professor, Department of Developmental and Preventive Sciences, Faculty of Dentistry, Kuwait University, Kuwait City, Kuwait.

[b] Postgraduate student, Boston University School of Dental Medicine, Boston, Mass.

[c] Associate Professor, Department of Restorative Sciences, Faculty of Dentistry, Kuwait University, Kuwait City, Kuwait.

Corresponding author: Heidi Kerosuo, DDS, PhD, Department of Developmental and Preventive Sciences, Faculty of Dentistry, Kuwait University, PO Box 24923, Safat 13110, Kuwait (e-mail: heidi.kerosuo@hsc.kuniv.edu.kw).

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cialists employed by the Ministry of Health. Resident aliens are limited to private treatment options. No general rationing of the access to care according to the severity of malocclusion or age has been implemented.

A study of adolescent males in Saudi Arabia suggested that 40% of the subjects were in need of comprehensive orthodontic treatment according to the criteria of the Norwegian Health Service.[28] But information on issues like distribution of orthodontic services, satisfaction with dentofacial appearance, or desire for treatment of Arab populations in the Middle East is very limited. Such information is mandatory for appropriate planning of the public treatment services.

Our aims were to explore orthodontic treatment experience, subjective need for treatment, and perceptions of teeth and dental appearance among urban and rural high school students in Kuwait. The specific aims were to analyze the influence of different background factors such as funding system, area of living, age, gender, ethnicity, and socioeconomic status on orthodontic treatment experience among Arab teenagers.

MATERIALS AND METHODS

Subjects

The target population consisted of second-year high school students from two of the five administrative districts of Kuwait: one was a rural district inhabited by families mainly of Bedouin origin (Jahra), and the other was a modern urban district with families having a more westernized lifestyle (Capital). The subjects were selected according to a cluster sampling technique, using school class as a cluster and corresponding to about 20% of the target clusters. The sample was stratified according to gender and area. Excluding subjects under 14 ($n = 5$) and above 17 years of age ($n = 55$), a total of 1076 subjects, 459 (43%) boys and 617 (57%) girls, were included. The mean age of the subjects was 15.1 years (range 14–17 years).

Data Collection

After approval by the ethical board of Kuwait University as well as by the Ministry of Education, the data were collected using a questionnaire that was completed by the students during the course of one school hour. The school visits were made without prior notice to the students, and all students who were present returned the questionnaire. The questions were translated to Arabic by one of the authors (Dr Abdulkarim) and modified according to the results of a pilot study. One of the authors (Dr Abdulkarim) provided comprehensive verbal instruction before handing the questionnaires to the students. He also checked the completed questionnaires for possible inaccuracies as they were handed in, and if inaccuracies were detected, he asked the students to make appropriate corrections.

Information was collected according to the categories listed in Appendix 1, but the questions were formulated differently in the actual questionnaire. All subjects answered questions 1–7, whereas questions 8–10 were addressed only to those who had received treatment or were entered on the waiting list, question 11 only to those who had completed active treatment, and questions 12–13 to those who had not received treatment (see Appendix 1).

Statistical analysis

The data were installed and analyzed in SPSS 9.0 for Windows (SPSS Inc., Chicago, Il). Frequencies were calculated for the number of subjects responding to each variable for questions 3 through 13 for the whole sample as well as separately for Kuwaitis and non-Kuwaitis and for Jahra and Capital. Chi-square tests were used to test for any intergroup differences between the two districts, between the nationalities, and between the socioeconomic standard (SES) groups (question 2), as well as to test for gender differences. Student's *t*-tests were used to test for any differences in mean ages. A multivariate logistic regression analysis was used to study the effect of background variables on orthodontic treatment experience. These analyses were performed only for Kuwaitis and separately for treated subjects and for those on the waiting list. The effect of the following background (independent) variables on being on the waiting list was analyzed: age (continuous variable), gender (dichotomous), Capital vs Jahra (dichotomous), and the variables derived from questions 1–6 and 12. These multiscore variables were dichotomized as follows: questions 1 and 2, score 3 vs 1, 2; questions 3 and 4, scores 3, 4 vs 1, 2, 5; questions 5 and 6, scores 1, 2 vs 3–5; question 12, score 1 vs 2, 3. For the analysis of past or present treatment history, the same variables were included, except variables derived from questions 3–5 and 12, which may have been influenced by the treatment itself. For each independent variable, the odds ratios and their 95% confidence intervals were calculated.

RESULTS

The majority (79%) of the subjects were Kuwaiti citizens. The remaining were resident Arabs without citizenship (5%) or with citizenship of neighboring Arab countries (16%). The non-Kuwaiti subjects represented 45% in Jahra as opposed to only 5% in Capital.

Treatment experience

Kuwaitis. Subjects in Capital had undergone orthodontic treatment significantly more often than those in Jahra, whereas no district-level difference could be detected in the frequency of subjects on the waiting list (Table 1). In both districts, the number of subjects on the waiting list was more than the number of subjects who had undergone treat-

TABLE 1. Orthodontic Treatment Experience Among Kuwaiti and non-Kuwaiti High School Students in Jahra and Capital, N = 1076[a]

	Orthodontic Treatment Experience				
	No, n (%)	Yes, n (%)	Waiting List, n (%)	Don't Know, n (%)	Total, n (%)
Kuwaitis					
Jahra	188 (78)	12 (5)	31 (13)	10 (4)	241 (100)
Capital	430 (71)	68 (11)	88 (15)	19 (3)	605 (100)
Total	618 (73)	80 (10)	119 (14)	29 (3)	846 (100)
Non-Kuwaitis					
Jahra	169 (84)	4 (2)	21 (10)	7 (4)	201 (100)
Capital	25 (86)	1 (4)	3 (10)	0 (0)	29 (100)
Total	194 (85)	5 (2)	24 (10)	7 (3)	230 (100)
Total	812 (76)	85 (8)	143 (13)	36 (3)	1076 (100)
Jahra	357 (81)	16 (3)	52 (12)	17 (4)	442 (100)
Capital	455 (72)	69 (11)	91 (14)	19 (3)	634 (100)

[a] Statistical analysis—Kuwaitis vs non-Kuwaitis: $\chi^2 = 17.073$; $df = 3$; $P = .001$. Jahra vs Capital: Kuwaitis: $\chi^2 = 9.136$; $df = 3$; $P = .028$; Non-Kuwaitis: $\chi^2 = 1.272$; $df = 3$; nonsignificant ($P > .05$).

ment, a total of 119 and 80 subjects, respectively (Table 1). Girls had received treatment significantly more often than boys, 12% and 6%, respectively ($P < .05$).

The mean age at the start of treatment was 13.3 years (SD, 1.5), with no significant difference between Jahra and Capital. The youngest age at treatment start was 9 years (one subject), and only five subjects (6%) had started treatment at the age of 9 or 10 years. The majority (73%) of the subjects had started treatment at 13–15 years of age. The mean age of subjects on the waiting list was 15.0 years (SD, 0.81).

The majority (80%) of the treatments were provided in the specialist clinics operated by the Ministry of Health, and the remaining were performed in private clinics in Kuwait or elsewhere. The main part (87%) of the treatments was a result of the subjects' own or their parents' initiative. The effect of dentist referral as a source was 13% in Capital and 0% in Jahra. Half of the 80 subjects with orthodontic treatment experience were still under active appliance therapy.

Non-Kuwaitis. Only five (2%) of the non-Kuwaitis had received orthodontic treatment, which was significantly lower than the corresponding number for Kuwaitis ($P = .001$) (Table 1).

Perceptions and subjective treatment need

No significant differences in views were detected between Kuwaitis and non-Kuwaitis regarding the variables in Table 2. About two-thirds of the subjects were very or rather satisfied with their dental alignment (Table 2). The subjects from Jahra were significantly less satisfied than those from the capital ($P < .05$), but the satisfaction did not differ significantly between genders or among the SES groups, neither did it differ between subjects with or without orthodontic treatment experience ($P > .05$). Satisfaction with dental health was significantly higher ($P < .05$) among subjects of lower SES than among those of higher SES. Girls rated the importance of teeth for facial appearance higher than did boys ($P < .001$).

TABLE 2. Percentage Distribution of Answers to Questions 3–6 of the Questionnaire According to Score (see Materials and Methods). Score 1 Denotes the Most Positive and Score 4 the Most Negative End of the Answers; Score 5 = No Opinion. N = 1076.

	Scores 1–5 (%)					
Topic of Question	1	2	3	4	5	Total
Satisfaction with tooth alignment	26	41	17	9	7	100
Satisfaction with dental health	22	36	20	13	9	100
Importance of teeth for appearance	85	12	1	1	1	100
Dental appearance vs classmates	19	44	19	5	13	100

TABLE 3. Percentage Distribution of Self-Reported Need for Treatment in Jahra and Capital (Question 12) among Kuwaiti and non-Kuwaiti Students. Subjects Who Had Received Treatment Did Not Answer This Question. Six Answers Missing. N = 985[a]

Treatment Need	Jahra, n (%)	Capital, n (%)	All, n (%)
Kuwaitis			
Yes	67 (29)	211 (40)	278 (37)
No	122 (54)	228 (43)	350 (46)
No opinion	39 (17)	94 (17)	133 (17)
Total	228 (100)	533 (100)	761 (100)
Non-Kuwaitis			
Yes	64 (33)	12 (43)	76 (34)
No	98 (50)	12 (43)	110 (49)
No opinion	34 (17)	4 (14)	38 (17)
Total	196 (100)	28 (100)	224 (100)

[a] Statistical analysis—Jahra vs Capital: Kuwaitis: $\chi^2 = 8.574$; $df = 2$; $P = .014$; non-Kuwaitis: $\chi^2 = 1.142$; $df = 2$; nonsignificant ($P > .05$). Kuwaitis vs non-Kuwaitis: $\chi^2 = 0.701$; $df = 2$; nonsignificant ($P > .05$)

The Kuwaitis in Capital expressed subjective need for orthodontic treatment more often than the Kuwaitis in Jahra (Table 3). Among non-Kuwaitis, the difference was not statistically significant (Table 3). Subjective treatment need did not differ between genders or SES groups, neither for Kuwaitis nor for non-Kuwaitis ($P > .05$). The major reported reason for treatment need was a bad or a nonattractive alignment of the teeth (59%).

Variables affecting treatment experience

Among Kuwaitis, the odds of being on the waiting list was 18-fold for those with reported subjective treatment need as opposed to those without ($P < .001$) and about twofold for those dissatisfied with their tooth alignment in contrast to those who were satisfied ($P < .05$) (Table 4). The odds of receiving orthodontic treatment were about

TABLE 4. Odds Ratios and Upper and Lower Boundaries of 95% Confidence Interval for Background (Independent) Variables to be on the Waiting List for Orthodontic Treatment (Dependent Variable) in a Logistic Regression Model. Age is Continuous Variable, whereas all the Others are Dichotomized. Non-Kuwaitis and Subjects With Present or Past History of Orthodontic Treatment are Excluded From the Analysis, N = 687[a]

Independent Variables	Waiting List for Orthodontic Treatment			
	OR	CI Lower	CI Upper	Significance
Age	0.930	0.676	1.280	NS
Female gender	0.634	0.374	1.076	NS
Capital vs Jahra	0.721	0.383	1.360	NS
Higher education of the head of the household	1.478	0.847	2.580	NS
Higher school performance	1.209	0.707	2.068	NS
Higher importance given to teeth for general facial appearance	0.953	0.171	5.301	NS
Dissatisfaction with teeth alignment	1.969	1.125	3.449	$P < .05$
Subjective need for orthodontic treatment	18.029	9.175	35.428	$P < .001$
Dental appearance perceived more attractive compared with classmates	1.088	0.621	1.905	NS
Dissatisfaction with dental health	1.511	0.917	2.488	NS

[a] CI indicates confidence interval; OR, odds ratios; NS, nonsignificant ($P > .05$).

TABLE 5. Odds Ratios and Upper and Lower Boundaries of 95% confidence interval for Background (Independent) Variables to Receive Orthodontic Treatment (Dependent Variable) in a Logistic Regression Model. Age is a Continuous Variable, Whereas All the Others are Dichotomized. Only Kuwaitis are Included in the Analysis, N = 785[a]

Independent Variables	Received Orthodontic Treatment			
	OR	CI Lower	CI Upper	Significance
Age	1.128	0.815	1.560	NS
Female gender	1.980	1.156	3.390	$P < .05$
Capital vs Jahra	2.236	1.080	4.633	$P < .05$
Higher education of the head of the household	1.372	0.807	2.335	NS
Higher school performance	1.214	0.729	2.024	NS
Higher importance given to teeth for general facial appearance	1.626	0.210	12.612	NS

[a] CI indicates confidence interval; OR = odds ratios; NS, nonsignificant ($P > .05$)

twofold for females vs for males and also for subjects from Capital vs from Jahra ($P < .05$) (Table 5).

DISCUSSION

Owing to the sampling method, the results of this study represent second-year high school students in the two districts studied. The majority of the questions addressed facts that students at that stage are likely to know and recall, and the questions on perception were based on a tried and proved format previously used in similar studies.[29] Considering our efforts to avoid errors during completion of the questionnaire, the results may be considered valid. Second-year high school students were selected as the target group because the permanent dentition typically is established by that stage, so that under optimal circumstances, orthodontic treatment to those in need should have been identified and initiated.[30]

Our finding of a higher treatment rate of Kuwaitis in the urban Capital (11%) when compared with Kuwaitis in rural Jahra (5%) may be because of the more favorable specialist per capita ratio in the capital[31] and supports the theory that availability of orthodontic services affects the uptake of treatment.[17] Previous results regarding whether an association exists between social class and orthodontic treatment experience are contradictory in societies offering free-of-cost services.[6,13–15,32] Our findings support the notion that other variables may be more important.[6,15,32]

The finding that treatment rate was five times higher for Kuwaiti than for non-Kuwaiti students is not likely to reflect differences in the need for treatment because all subjects in our sample were ethnic Arabs. Because subjective treatment need was similar in both Kuwaitis and non-Kuwaitis, the different uptake of treatment may rather be the consequence of differences in the access to treatment. In keeping with previous studies, this finding may highlight the significance of funding for treatment rate.[1,12,16] But the fact that nearly half of the non-Kuwaiti students belonged to the lowest social group as opposed to only one-quarter of the Kuwaitis may have contributed to that finding.[12,16]

Our findings support the argument that girls are more likely to pursue orthodontic treatment than boys.[4–6] Because no gender differences, excluding a few individual occlusal traits, have been observed in the total frequency of malocclusion,[33–35] the likely explanation is that most societies consider attractive physical appearance to be more important for girls than for boys.[18,36] In line with previous results, the girls in our sample valued teeth as more important for facial appearance than boys did, reflecting the higher demand for treatment among girls than among boys.[37]

The age at treatment start was high in this sample, compared with previous studies from other countries providing public funding.[8,9,32] The age was also high with respect to recommendations for optimal timing of orthodontic treatments.[38–40] By 13–15 years, most girls would have passed their growth peak and will therefore miss growth modification as a treatment option. The fact that hardly any treatments were started before 10 years of age may reflect that no mechanism was available to identify subjects in need of early treatment.

The subjective need for treatment was higher in urban Capital than in rural Jahra, confirming earlier findings that subjects in rural areas, characterized by low orthodontic treatment rates, are likely to demonstrate a greater degree of tolerance toward malocclusion.[2,21] This explanation is also supported by the previous finding that peer groups have a greater influence on the uptake of orthodontic treatment than other variables such as social class or gender.[15]

The unavailability of orthodontic services for the non-Kuwaitis did not decrease their self-perceived treatment need as compared with their Kuwaiti peers. This may be attributable to the fact that the two groups lived in the same areas and went to the same schools. Therefore, other factors like peer group at school and treatment rate in the area of living may have had greater influence on perceived need for treatment than whether or not treatment was readily available.[2,15]

In this study, subjective need for treatment and dissatisfaction with dentofacial appearance were the only variables of significance for increasing the odds of being on the waiting list. This is in keeping with our finding that the initiative for treatment was typically made by the subjects themselves or by their parents and only rarely by a dentist. But it should be stressed that being on the waiting list does not necessarily imply that treatment will be actually rendered.

Depending on criteria and indices, approximately 25% to 35% of adolescents from various populations and ethnic groups have been considered to definitely need orthodontic treatment, and more than half present with some degree of treatment need.[5,12,41–43] The rather low treatment rate found in our study, compared with standard estimations of orthodontic treatment need as well as with the limited information on treatment need of other Arab populations in the Middle East,[28,43] suggest that the provision of orthodontic treatment in Kuwait may be insufficient to cover the need and demand for treatment. The higher proportion of subjects on the waiting list compared with the proportion that had completed treatment or was under active treatment, as well as the high age of the students on the waiting list, is likely to reflect the same lack of resources as well as an inadequate number of providers, resulting in slow unloading from the waiting list.

Our study suggests that access to free-of-cost orthodontic treatment is likely to be of major importance for frequency of treatment, whereas it does not seem to affect the self-perceived need for treatment. Gender and area of living may be significant for receiving orthodontic treatment. Our results also suggest that treatment rate in Kuwait may be considerably below the subjective desire for treatment. Our findings indicate that further information is needed for successful planning of orthodontic services in Kuwait.

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APPENDIX 1. Information Collected by the Questionnaire

0	*Personal data*	*Name, gender, school, nationality, birth date*
1	*Performance at school*	*1 = lower than average, 2 = average, 3 = higher than average*
2	*Education of head of household, corresponding to a 3-grade classification of socioeconomic standard*	*1 = lower/middle school, 2 = high school, 3 = college/university*
3	*Satisfaction with tooth alignment*	*1 = very satisfied through 4 = very dissatisfied, 5 = no opinion*
4	*Satisfaction with dental health (caries, gingival inflammation)*	*1 = very satisfied through 4 = very dissatisfied, 5 = no opinion*
5	*Dental appearance compared with classmates/peers*	*1 = among the best through 4 = among the worst, 5 = no opinion*
6	*Importance of teeth for general facial appearance*	*1 = very important through 4 = not at all important, 5 = no opinion*
7	*Orthodontic treatment experience*	*1 = yes, 2 = no, 3 = on waiting list, 4 = don't know*
8	*Treatment initiative*	*1 = self, 2 = parents, 3 = dentist, 4 = no opinion*
9	*Source of treatment*	*1 = Ministry of Health, 2 = private clinic in Kuwait, 3 = somewhere else, 4 = not yet started*
10	*Age at treatment start*	*1 = actual age in years, 2 = no opinion, 3 = on waiting list*
11	*Satisfaction with treatment result*	*1 = yes, 2 = no, 3 = no opinion*
12	*Subjective treatment need*	*1 = yes, 2 = no, 3 = no opinion*
13	*If yes to 12, main reason for treatment need*	*1 = bad/nonattractive tooth alignment, 2 = impaired function, 3 = other reason, 4 = no opinion*